

“On the Similarity of the Short-period Pressure Variation over Large Areas.” By Sir NORMAN LOCKYER, K.C.B., F.R.S., and WILLIAM J. S. LOCKYER, M.A., Ph.D., F.R.A.S. Received October 18,—Read December 4, 1902.

[PLATES 1 and 2.]

In a paper presented in June last to the Society,\* we pointed out the existence of a short-period oscillation of barometric pressure over the Indian area corresponding generally with a variation in the percentage number of prominences recorded on the sun's limb. This oscillation was further shown not to be limited to the Indian area, but to be marked at a far distant station, as Cordoba, in South America.

The present paper, which is a continuation of this investigation, was undertaken to extend the research over a larger area.

The monthly means of the pressure variations for each station have been divided as previously into two periods, namely, those months in which the pressures are above and those in which they are below the normal, the normal being the mean pressure for the whole period under investigation in each locality.

In dealing with large areas, it happens that during the same period of time (that is generally but not invariably six months), the pressure is above the normal in some places, and below the normal in others; the similarity of the curves representing the variation of the mean for this period, from year to year, indicates therefore that, in one case, a rise in the curve denotes that the pressure is higher, and, in the other, that the pressure is not so low as usual.

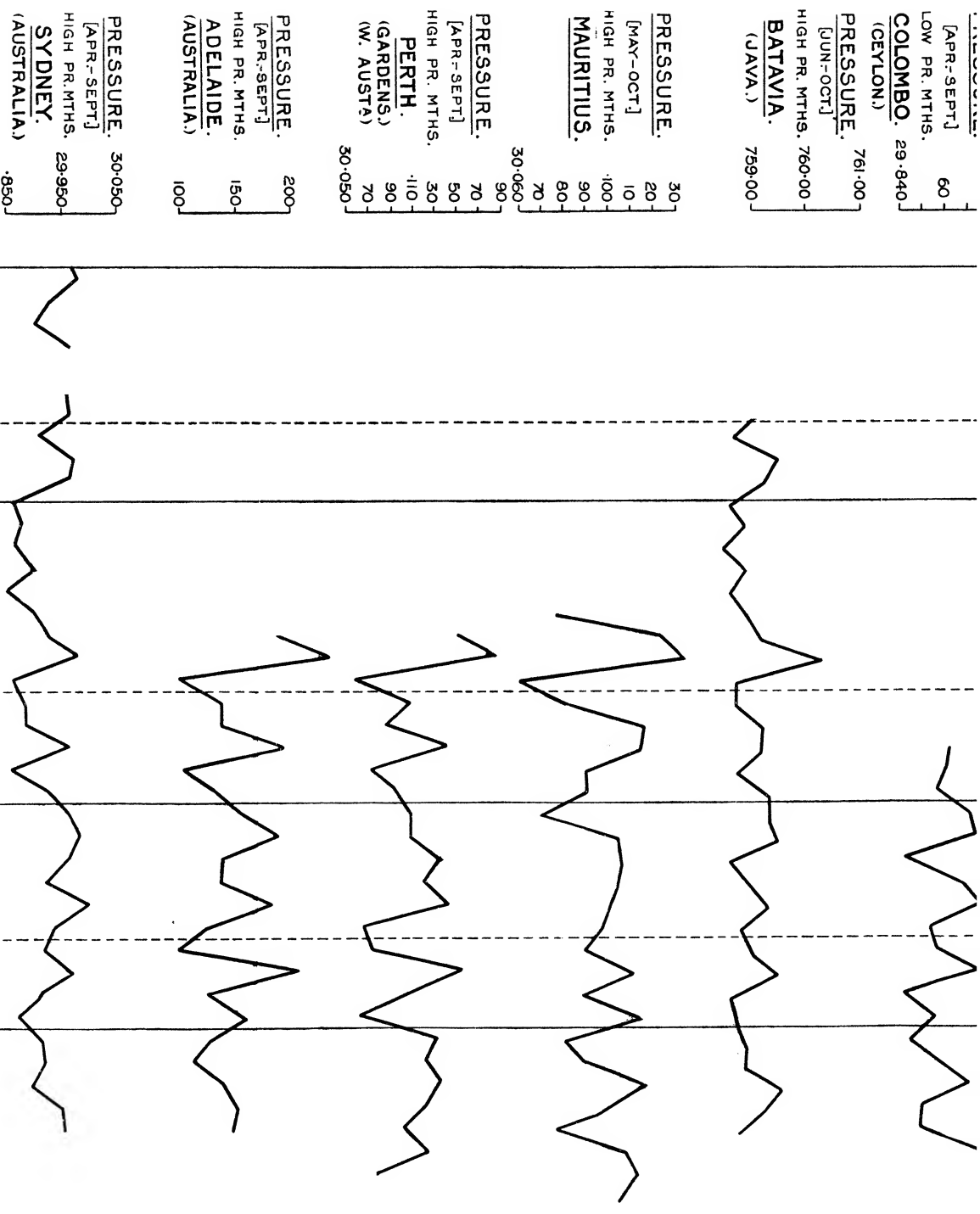
The accompanying curve (Plate 1) illustrates the variations of pressure which have been analysed. Commencing with Indian pressures (as represented by Bombay) the area was gradually extended to Ceylon (Colombo), Java (Batavia), Mauritius, and finally to Australia (Perth, Adelaide and Sydney).

In this set of curves about the same months are in question, so that the pressure variations refer in the northern hemisphere to the low pressure (summer) months, and in the southern hemisphere to the high pressure (winter) months.

The striking similarity between these curves shows that over the whole of this area, which includes both north and south latitudes, the same kind of variations is in action, and that therefore the whole region is intimately connected meteorologically.

It was indicated in our previous paper that the pressure of Cordoba, in South America, was the inverse of that of India for the same period. Since the Indian pressure variations are seen now to extend over a

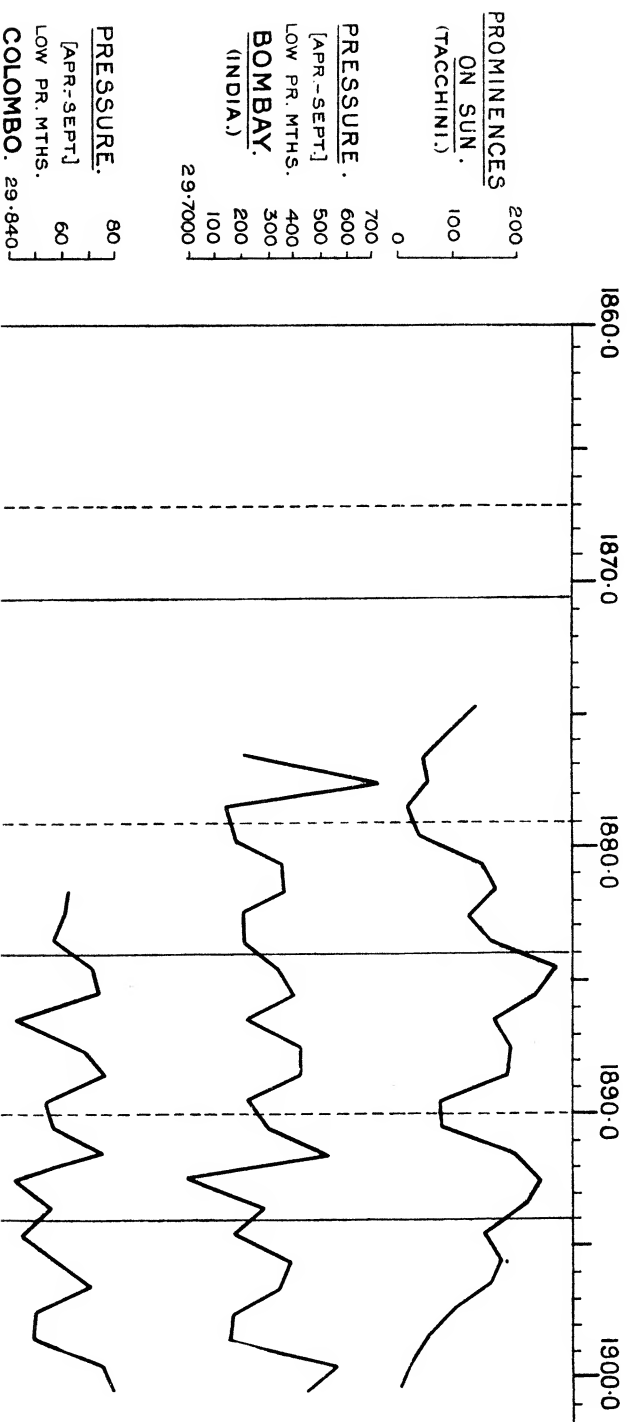
\* “On Some Phenomena which suggest a Short-Period of Solar and Meteorological Changes.” ‘Roy. Soc. Proc.’ vol. 70, p. 500.



*Note.*—The vertical continuous and broken lines represent the epochs of maxima and minima of sunspot activity.

*Lockyer and Lockyer.*

*Proc. Roy. Soc., vol. 71, Pl. 1.*



PRESSURE. 29.860  
 [OCT.-MAR.] .870-  
 HIGH PR. MTHS. .880-  
BOMBAY. .890-  
 .900-  
 (INDIA) .910-  
 (SCALE INVERTED) 29.920

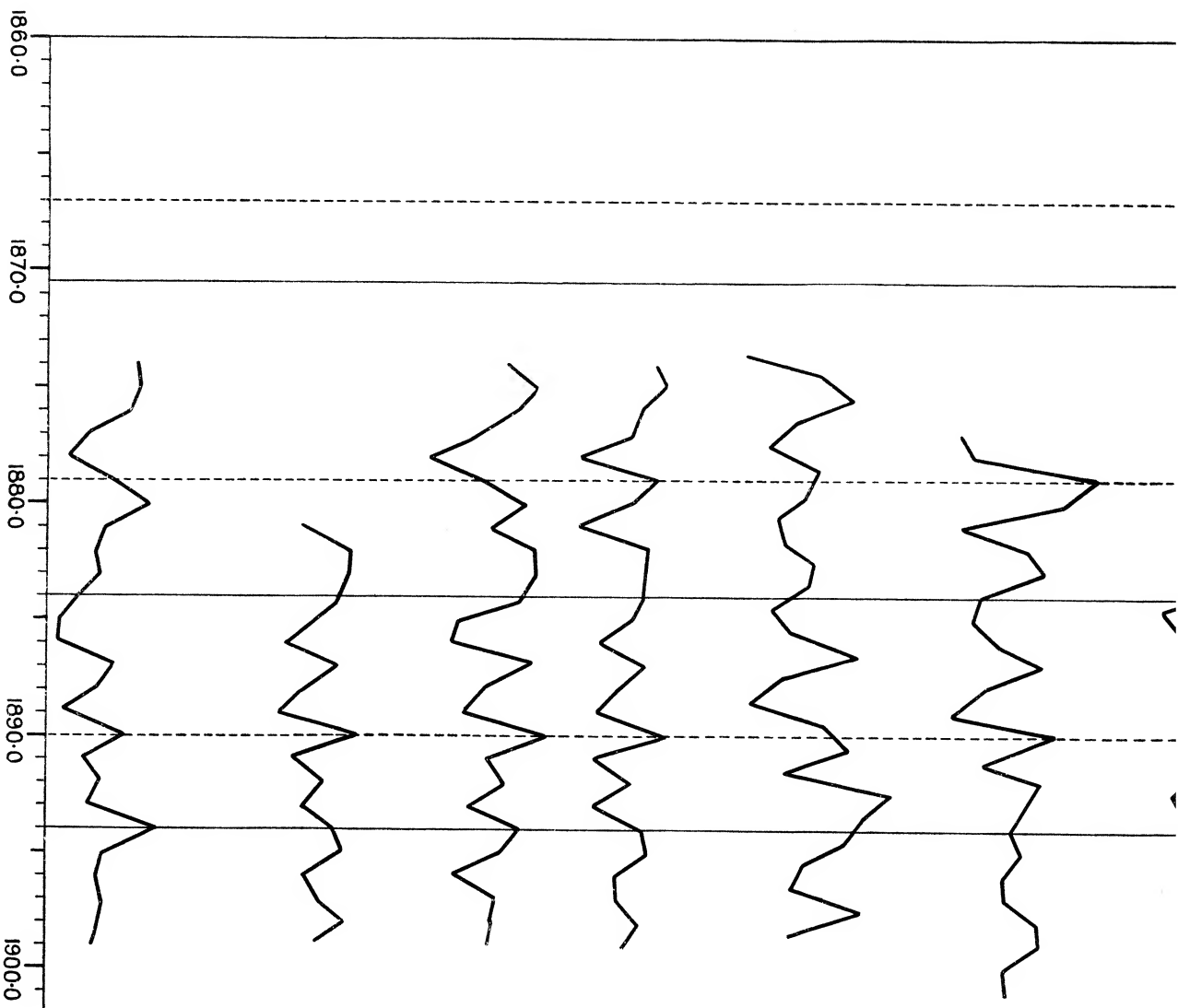
PRESSURE. 72.800  
 [APR.-SEPT.] .700-  
 HIGH PR. MTHS. .  
CORDOBA 600-  
 (S. AMERICA) 72.500

PRESSURE. 30.100  
 [OCT.-MAR.]  
 HIGH PR. MTHS. .050-  
MOBILE.  
 (U.S.A.) .000

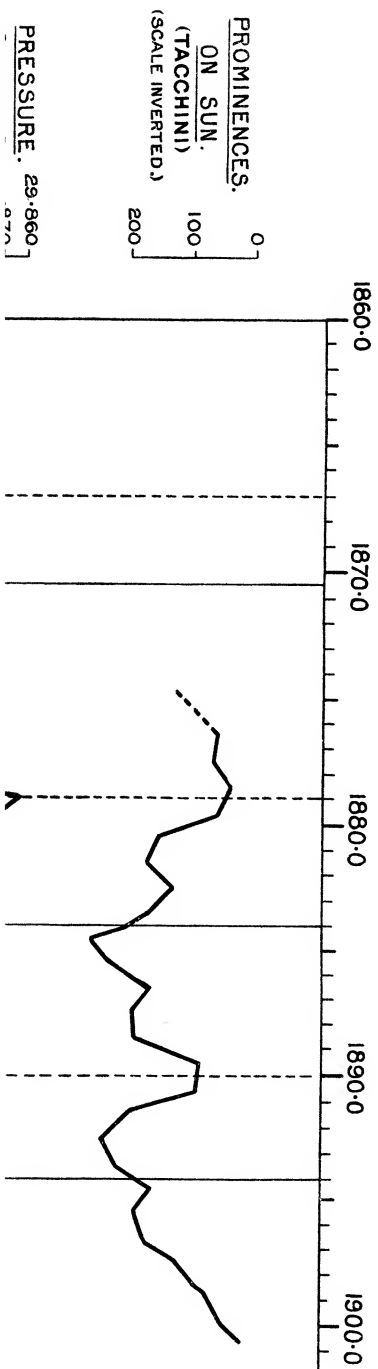
PRESSURE. 30.130  
 [NOV.-FEB] .100-  
 HIGH PR. MTHS. .080-  
JACKSONVILLE. .060-  
 .040-  
 (FLORIDA U.S.A.) 30.020

PRESSURE. 30.100  
 [NOV.-MAR.] .080-  
 HIGH PR. MTHS. .060-  
PENSACOLA. .040-  
 .020-  
 (FLORIDA U.S.A.) 30.000

PRESSURE. 30.000  
 [NOV.-APR.]  
 HIGH PR. MTHS. .950-  
SAN DIEGO.  
 (CAL. U.S.A.) 29.900



*Note.*—The vertical continuous and broken lines represent the epochs of maxima and minima of sunspot activity.



region on both sides of the equator, it was important to study the extent of the region in the New World in which pressure variations similar to those of Cordoba had been recorded.

As Cordoba represents an area south of the equator, a portion of the United States of America was taken as typifying an area with north latitude and in about the same longitude, and a commencement was made along the lowest available parallel of latitude. This was rendered possible by the kindness of Professor F. Bigelow, of the Weather Bureau, who very generously forwarded proof-sheets of a new reduction of the pressures of many stations. We wish to take this opportunity of expressing to him our best thanks.

Treating these pressures in the same way as those formerly investigated in the Indian region, several stations which had the best record were chosen. A graphical representation of the variations of four of these stations (Mobile, Alabama; Jacksonville and Pensacola, Florida; San Diego, California) is given in Plate 2, and for the sake of comparison the pressure of Cordoba, with the inverted curves representing the Bombay pressure and solar prominence variation. This series of curves refers in all cases to the variations of the means of the high pressure (winter) months (October to March in most cases). At Cordoba, which has a southern latitude, the high pressure months extend from April to September.

The result of the comparison shows that in this region of the world we have a large area, the pressure variations of which are strikingly similar to, but are the inverse of, those recorded in nearly the antipodal part of the globe.

The facts observed are so suggestive that we are continuing the inquiry by collecting and discussing observations made in other areas.

Although the general agreement between the two main sets of curves is most striking, there are minor differences which probably, as stated in the previous paper, will eventually help us to determine those cases in which the prominence effects on pressure are masked by some special local conditions. It may be added that the available observations of prominences refer more directly to their quantity than to their intensity.

We wish to express our thanks to Mr. W. N. Shaw, F.R.S., who kindly placed the records of the Meteorological Office at our disposal; and to Mr. Hodgson, who has extracted the requisite data from the available records of pressure, and constructed some of the curves.

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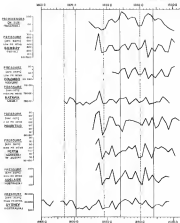


Fig. 1. The vertical coordinate and surface data at point (longitude of location and season of average velocity).

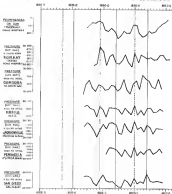


Figure 1. The vertical measures and broken lines represent the specific objectives and measures of strategic activity.